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SPALDING concludes that even in deserts soils play a great part in distribution, and that physiographic factors play an efficient part as in the East. He finds that as the region is gradually base-leveled, the area of the mesquite association widens, that the palo verde-catclaw association advances similarly along the washes, and that the creosote bush advances along the slopes. The latter species is of wide range, appearing in areas as a pioneer and also remaining as the final possessor; and yet the xerophytic structures of this plant are simple as compared with the spectacular features of the giant cactus, whose range is much more restricted. The soil factors that appear most important are the soil water content, the percentage of alkali, and the soil texture (involving aeration). That not all distributional factors reside in the soil is shown by the fact that the giant cactus is chiefly an inhabitant of south slopes (attributed to the need for high temperatures), and especially by the fact that *Lippia Wrightii* is restricted to the north slope about the laboratory, while it is just as definitely restricted to the south slope in the mountains at an altitude of 1000^m above the laboratory. SPALDING has here given us one of the most notable of recent contributions, clearly showing that the intensive study of plant associations is quite as productive in results in deserts as in mesophytic climates.—H. C. COWLES.

Evolution

It is a matter for congratulation when the subject-matter of any great field is gathered together and systematized by a master hand. The first volume of LOTSY's lectures on the theories of descent has been reviewed in these pages,³ and the second volume should have been noticed sooner.⁴ The first chapters of the second volume consider various phases of Darwinism, noting first the factors that influenced DARWIN's investigations. The various prerequisites of Darwinism, such as variability, selective value, and the struggle for existence, are first considered. It is recognized that DARWIN did not attempt to explain variability, assuming it as given. Nor did DARWIN distinguish sharply between variations and mutations, a view that seems to the author to be borne out by KLEBS's experiments. After lectures on orthogenesis, selective value, the struggle for existence, the inheritance of deviations, there follow several lectures on the facts of paleontology and plant geography that are explained by the Darwinian theory. The objections to Darwinism are considered, the matter of the isolation of deviating individuals being considered one of the more important. The closing lectures deal with post-Darwinian theories, notably those of WALLACE, NÄGELI, and DEVRIES, while one lecture is devoted to Neolamarckism. At the close is an excellent bibliography. LOTSY's volumes form an indispensable compendium of information, not alone to students of evolution, but to all biologists, and particu-

³ BOT. GAZETTE 42:60-61. 1906.

⁴ LOTSY, J. P., Vorlesungen über Descendenztheorien mit besonderer Berücksichtigung der botanischen Seite der Frage, gehalten an der Reichsuniversität zu Leiden. Zweiter Teil. 8vo. pp. vi+420. pls. 13. figs. 101. Jena: Gustav Fischer. 1908. M 12; geb. M 15.

larly to all botanists, since this work presents especially the botanical aspects of the evolutionary theories; most former works of similar character have had a strong zoological bias, which has resulted in a most imperfect consideration of botanical material.—H. C. COWLES.

MINOR NOTICES

Monograph of Oenothera.—LÉVEILLÉ⁵ has issued another fascicle of his monograph of the genus *Oenothera*, which includes the *Onagras* *O. Lamarckiana*, *O. biennis*, *O. grandiflora*, and related forms. His work on most of the species has been entirely from herbarium material, with the result that the process of "lumping" rather than "splitting" the species is carried to an extreme. Numbers of species are combined into larger groups, for which new names are proposed. For example, *O. pyramidalis* Lévl. is to include *O. rhombipetala* Engelm. and Gray, *O. heterophylla* Spach, and several others. Similarly, *O. polymorpha* Lévl. includes *O. mollissima* L., *O. longiflora* Jacq., *O. nocturna* Jacq., and a number of others. The "lumping" process reaches an extreme, however, in the treatment of *O. biennis*, *O. Lamarckiana*, and related forms. All are gathered into one comprehensive "species," *O. communis* Léveillé, having three "races": *biennis* L., *Vriesiana* Lévl., and *japonica* Guffroy. The last is a Japanese form with triangular seeds. The race *Vriesiana* includes *O. Lamarckiana* and all its mutants, and one or two other species. The race *biennis* L. includes such well-recognized species as *O. muricata* L., *O. parviflora* L., *O. Hookeri* Torr. and Gr., *O. Oakesiana* Robb. and Wats., *O. strigosa* Rydb., *O. cruciata* Nutt., and a number of others. Many of these have been shown to come true in cultures, and the types are sufficiently distinct to be easily recognizable even as very young seedlings. The present *O. biennis* L., after excluding all the segregates, is probably still considered sufficiently "polymorphic" by most American botanists.

DEVRIES has emphasized the necessity of differentiating between elementary species and Linnean species, the latter only being recognized in the floras and manuals, and the elementary species being enumerated in their subordinate rank. But the indiscriminate "lumping" practiced here far surpasses the necessities of even the manuals.

Having thus combined this host of forms into one "species" (*O. communis*), LÉVEILLÉ proceeds to argue that mutation accounts for the origin of races, but that the origin of species is another problem. He states that he grew *O. Lamarckiana* and several of the mutants in his garden for five years, from seeds of DEVRIES, and reports various wonderful transformations of one form into another. DEVRIES's investigations have been verified abundantly by later careful workers, so that LÉVEILLÉ's statements need not be taken seriously, especially since he made no attempt to prevent crossing. He naïvely states that the plants were grown in two separate gardens, and that, in one case at least, the forms were sufficiently distant to prevent crossing!—R. R. GATES.

⁵ LÉVEILLÉ, H., Monographie du genre *Oenothera* (with the collaboration of Ch. GUFFROY). pp. 339-408. Le Mans. 1909.